MINNOWS

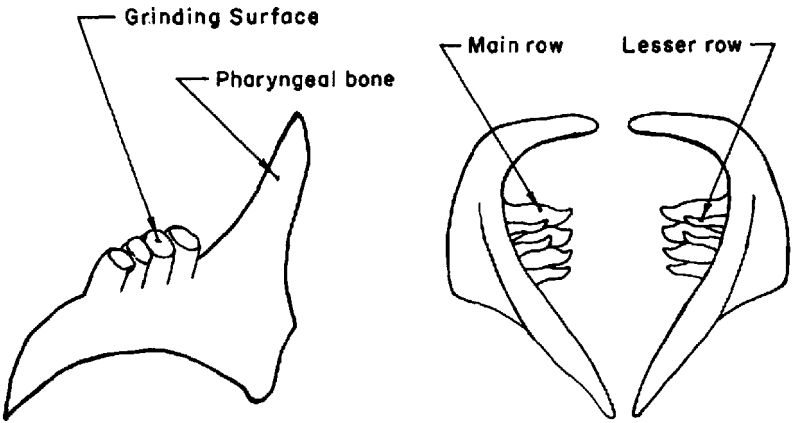
Minnows are the most numerous, both in kinds and numbers, of California's nongame fishes. Before the introduction of eastern game fishes, minnows dominated the State's freshwater fish populations.

Minnows, like suckers, are generalized fish without teeth in the mouth, scales on the head, adipose fin, muscular stomach, or, with the exception of a few kinds, spines in the fins. Minnows have throat teeth, but these are less numerous than those of the suckers.

The throat or pharyngeal teeth vary in number and shape. They may be pointed, hooked at the tips, serrated, molar-like, or even spoon-shaped. They are located on the modified fifth gill arch, deep in the throat. As a general rule, carnivores have pointed or hooked teeth, plankton feeders have comb-like teeth, and omnivores and vegetarians feature blunt or molar-like teeth. Different species of minnows are often distinguished most readily by their dental characteristics.

Pharyngeal bones can be removed by dissection, or, better, by carefully inserting a hooked needle behind the last gill opening under the shoulder girdle, hooking onto the pharyngeal bone, and gently pulling forward and outward. The teeth may be cleaned by teasing the flesh away with needles, or by scrubbing with a tooth brush. Care must be taken not to break off the teeth.

A hand lens is helpful in examining the teeth. In most cases a principal row of 4 or 5 larger teeth will be present, sometimes with a set of 1 or 2



Pharyngeal Teeth
The teeth to the left are 4-4, as found in goldfish. The formula for the teeth at the right is 2, 4-4.2, as in the speckled dace.

smaller ones in front. The two sides are usually, but not always, symmetrical. Thus, “teeth 2, 4-5, 1” indicates two rows of teeth on each bone, on the left side 4 in the principal row and 2 in the lesser; on the right side, 5 in the main row and 1 in the other. “Teeth 4-4” indicates a single row of 4 on each pharyngeal bone, and so on.

Minnows occupy many habitats, from cold trout streams to the remnants of the great tule marshes of the Sacramento-San Joaquin Delta. Several kinds will venture into brackish water, but none tolerates undiluted ocean water for long. Hence, many of our isolated coastal streams lacked native minnows or had distinctive populations.

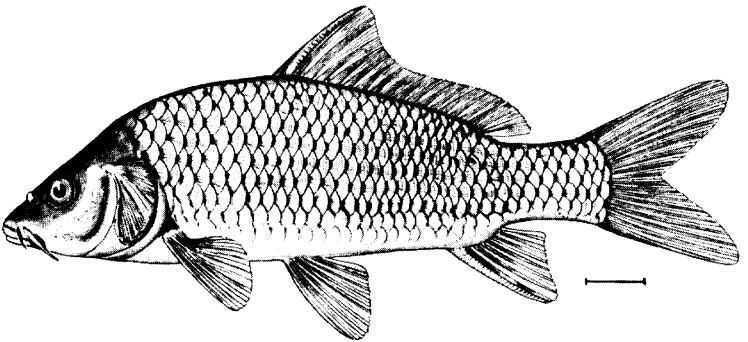
Clear-cut limitations in distribution are unknown for a number of species in California. Minnows such as tui chub and hitch have been widely transported as bait and now occur well outside their original ranges.

Water developments entailing large-scale transportation of water from one drainage to another also contribute to mixing of populations.

CARP

Cyprinus carpio

Cyprinus = ancient name for carp
carpio = carp



DISTINGUISHING CHARACTERISTICS

The body color ranges from brassy green to golden or yellow brassy to silver. The carp reaches a large size, with 20-pound individuals being common. It has a humped appearance and is quite heavy through the back. The scales are large. Occasionally, carp with only a few large scales are found. These are called mirror carp. A more rare variant in California has no scales at all and is called the leather carp. Carp have a long dorsal fin, the first ray of which is a heavy toothed spine. A similar spine occurs in the anal fin. The upper jaw has two barbels on each side. The molar-like pharyngeal teeth are in three rows, 1, 1, 3-3, 1, 1.

DISTRIBUTION IN CALIFORNIA

Carp were first introduced into California in 1872. Five individuals were imported from Holstein, Germany, and planted in ponds in Sonoma County. The species was soon being raised in large numbers for food. It now abounds in all of the lowland waters of the Central Valley, nearly all reservoirs in southern California, the Colorado River, and many small drainages in the coastal areas and the east slope of the Sierra Nevada. It is absent from some San Diego County reservoirs.

GENERAL INFORMATION

Carp eat animal matter, plant material, and mud. They are “rooters” and often keep the bottom stirred up so that the water remains muddy.

They enter the shallows in large numbers to spawn during the spring. At this time, they can be seen splashing and rolling with their backs out of the water. Carp are prolific breeders. Females weighing 15 to 20 pounds have produced 2,000,000 eggs in one season. They often severely overpopulate lakes and reservoirs. Carp prefer warm water, but large populations maintain themselves in Lake Almanor and other cool lakes, which also support trout. Carp are reported to reach a weight of 80 pounds. One fish reached an age of 47 years in captivity.

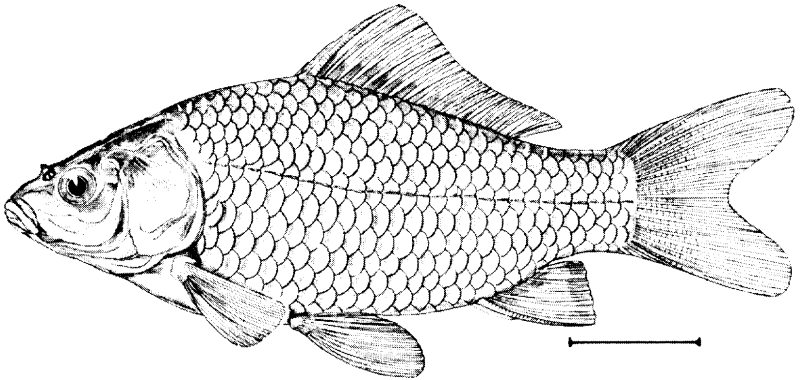
IMPORTANCE

The carp is the biggest “pest” of the nongame fish. It destroys aquatic plants utilized by waterfowl, roils the water, causing silt-sensitive fish to disappear, and competes directly with game fish for food and space. Because it is an extremely hardy fish, it often overpopulates waters and depresses game species. Carp are the object of numerous expensive eradication programs in sport fishing waters.

Although it is considered an all-around pest by many sportsmen, fishermen are regularly seen seeking carp for food and sport. In addition to this relatively minor use, 220,972 pounds of carp were harvested in California by commercial fishermen in 1962.

GOLDFISH
Carassius auratus

Carassius = old name for Crucian carp
auratus = gilded



DISTINGUISHING CHARACTERISTICS

Goldfish resemble carp in body shape, but lack barbels. They have a long dorsal fin, and a heavy, toothed spine in the dorsal and the anal fins. The color is often gold or mottled gold, black, and silver. Goldfish planted in open waters tend to revert to the original olive green color. Pharyngeal teeth are 4-4 and molar-like.

DISTRIBUTION IN CALIFORNIA

Goldfish were introduced into California prior to 1900. They are now found in the lowland streams of the Central Valley, in various urban ponds and lakes, and in numerous waters in southern California.

GENERAL INFORMATION

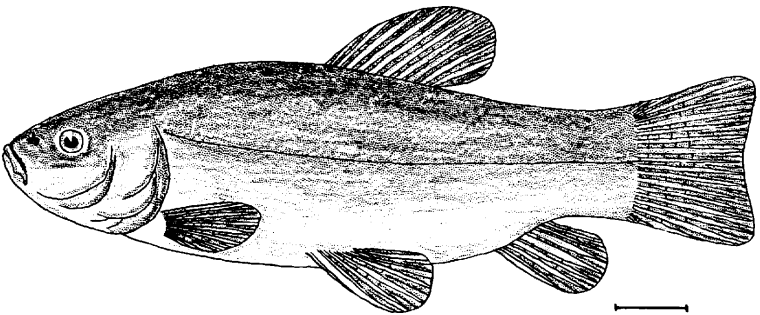
Goldfish feed on small animal and plant material. They are a popular aquarium fish, often used in back-yard fish ponds. They have been spread to numerous waters by individuals releasing them from home aquaria.

IMPORTANCE

Although smaller than carp, goldfish create much the same nuisance in trout lakes, from which they must sometimes be eradicated. They do not usually create a problem in warmwater lakes.

TENCH
Tinca tinca

Tinca = Latin for tench



DISTINGUISHING CHARACTERISTICS

The tench has a robust body with small scales embedded in the thick skin. The color is usually greenish to golden, with dark blue on the head, and yellowish on the belly. This fish has one barbel at each side of the mouth. There are no spines in the fins. The pharyngeal teeth are 4 or 5-5 or 4, with slightly hooked tips.

DISTRIBUTION IN CALIFORNIA

Tench were introduced illegally from Italy in 1922 into a reservoir near Half Moon Bay. They have been spread to lakes in Santa Cruz and San Mateo counties and to the Trinity and Klamath rivers.

GENERAL INFORMATION

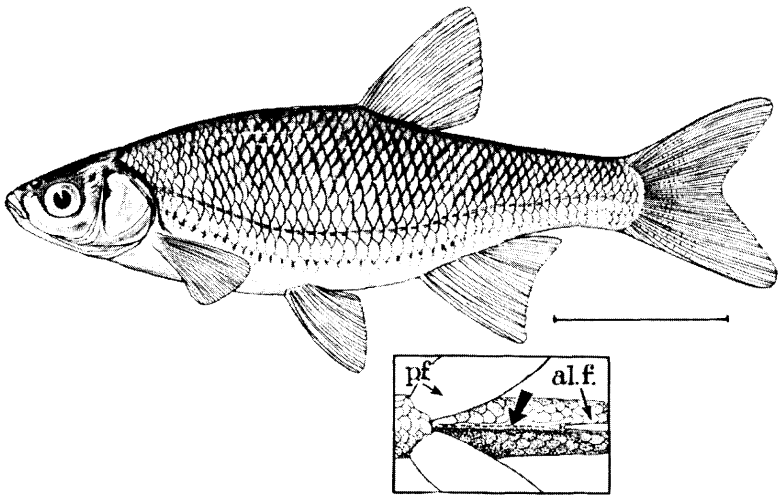
The tench is the largest of the European minnows. It lives in quiet rivers and small lakes or ponds. Spawning occurs in late spring and early summer, with large numbers of greenish-colored eggs produced. Food consists of detritus and small aquatic organisms.

IMPORTANCE

The tench is used as a food fish in Europe, but is of no importance here. It might cause problems in fish management similar to the carp and goldfish if allowed to spread to new waters in California.

GOLDEN SHINER
Notemigonus crysoleucas

Notemigonus = black half-angle
crysoleucas = gold-white



DISTINGUISHING CHARACTERISTICS

A small, flat-bodied minnow with greenish back, it has golden or silvery sides, and brass-colored belly. The fins are yellowish, or red in the breeding season. The scales are large. This species has a scaleless ridge or keel that extends from the pelvic to anal fins. The anal fin is sickle-shaped. The lateral line is strongly decurved. Teeth are 5-5, hooked, with a grinding surface.

DISTRIBUTION IN CALIFORNIA

The golden shiner was first imported from the eastern United States into San Diego County in 1891. It has become an important bait minnow in northern California since 1950, and is now established widely in the Sacramento-San Joaquin river system.

GENERAL INFORMATION

Golden shiners spawn in the spring and early summer. The adhesive eggs stick to vegetation or other objects. This species thrives in waters with heavy growths of aquatic vegetation.

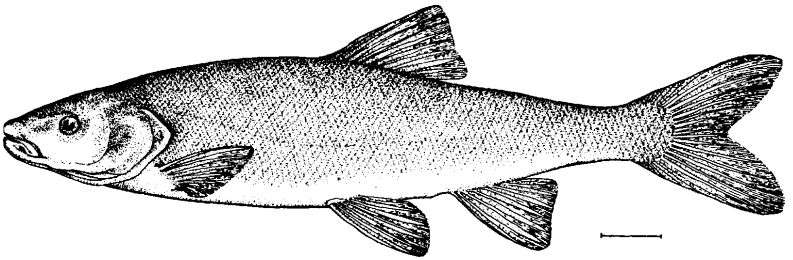
It is said to destroy mosquito larvae in lakes efficiently.

IMPORTANCE

Golden shiners are raised in large numbers by commercial bait dealers and are utilized as forage by warmwater game species in waters in which they are present. They may have a detrimental effect on trout in cooler waters.

SACRAMENTO BLACKFISH
Orthodon microlepidotus

Orthodon = straight tooth
microlepidotus = small-scaled



DISTINGUISHING CHARACTERISTICS

The blackfish is a large, dark minnow with an upturned mouth. It is nearly round in cross section and has a conically-shaped head. It has small, fine scales. In Clear Lake, Lake County, it grows to a length of two feet. The pharyngeal teeth are 5-6 or 6-6, very long, and nearly straight.

DISTRIBUTION IN CALIFORNIA

It is found in the large natural lakes of central California, such as Clear Lake, and the lower slough-like reaches of the Sacramento and San Joaquin rivers and their associated drainages. It does not move into the swifter portions of the tributaries or into the foothill reaches of the rivers.

The blackfish reached its greatest abundance in the marshy, overflow areas, like Tulare Lake. It has been introduced into southern California.

GENERAL INFORMATION

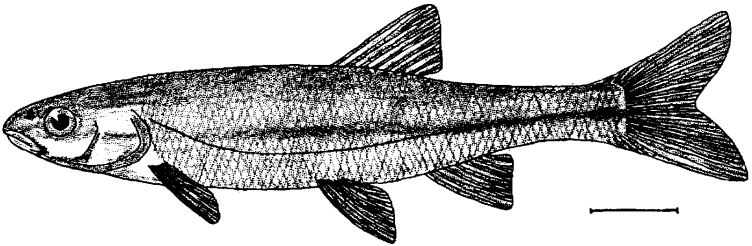
Like the carp, it spawns in shallows and is a prolific egg producer. A 17-inch female contained an estimated 350,000 eggs. The growth rate is rapid. In Clear Lake, blackfish range from 2.5 to 6.5 inches in length at the end of their first growing season. It feeds on plankton and bottom materials.

IMPORTANCE

The blackfish is of minor commercial importance, with over 100,000 pounds harvested in 1962: Fish are trucked alive to fish markets in Oriental districts, where the buyers select fish and carry them home alive. The young of this species are eaten by game fishes.

HARDHEAD
Mylopharodon conocephalus

Mylopharodon = throat tooth grinder
conocephalus = cone head



DISTINGUISHING CHARACTERISTICS

This large native minnow attains a length of about two feet. It is slender, the body cross section is round, and it has a large mouth in a conical, somewhat flattened head. A piece of skin, called a frenum, joining the center of the upper lip to the head, distinguishes it from the squawfish, which it otherwise resembles. The color is a bronze green above, shading to cream on the belly. The pharyngeal teeth are 2, 5-4, 2. Two or three of the teeth in the main row are molar-like, bluntly rounded, and much enlarged.

DISTRIBUTION IN CALIFORNIA

It is found generally throughout the rivers of the Sacramento-San Joaquin drainage and in several isolated basins, such as the Russian River.

GENERAL INFORMATION

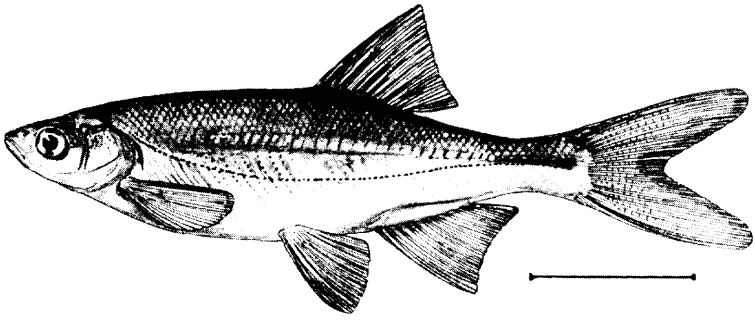
The hardhead is omnivorous, feeding upon insects when young and on small fish and aquatic plants when adult. The clearer foothill streams form its favored habitat. It spawns in the spring, although the spawning habits are not known. It is commonly associated with the Sacramento squawfish.

IMPORTANCE

When young, it is eaten by game fish. A few fish are taken each year by commercial fishermen.

HITCH
Lavinia exilicauda

Lavinia = a classical feminine name
exilicauda = slender toil



DISTINGUISHING CHARACTERISTICS

This native minnow has a deep, compressed body with a slender caudal peduncle. The head is small and conical, with a small mouth. The scales are large. The anal fin is longer and higher than in most native minnows. Males are smaller than females, and darker in coloration. The pharyngeal teeth are 4-5 or 5-5, long and compressed, with hooked tips and narrow, well-developed grinding surfaces.

DISTRIBUTION IN CALIFORNIA

Two subspecies of hitch are found in California:

The Sacramento hitch, *Lavinia exilicauda exilicauda*, is found throughout the lowland streams and lakes of the Central Valley, in Clear Lake, and in the Russian River.

The Monterey hitch, *Lavinia exilicauda harengus (harengus* = herring), inhabits streams tributary to Monterey Bay.

GENERAL INFORMATION

The hitch spawns mainly in streams, running up small creeks during early spring rains. In Clear Lake, this species has been observed spawning on gravelly shores. The hitch is prolific. A 10-inch female had 112,000 eggs. Young hitch feed on small animal plankton and insects along the shore. Adults eat plankton in the open waters. It lives in lowland streams, sloughs, and lakes, usually avoiding swift waters. Hitch grow rapidly, averaging about 5.5 inches long at the end of the first year's growth.

IMPORTANCE

The hitch was an important bait minnow before regulations against the capture, sale, and use of wild minnows were adopted. It has been the object of a number of expensive eradication programs where it interfered with sport fisheries. The young provide forage for warmwater game fish.